

**REMARKS**

It is noted, with appreciation, that the Examiner has indicated that claims 8-10 have been allowed. It is also noted that claim 5 is considered to contain allowable subject matter if amended as suggested by the Examiner.

Claims 1, 3, 6, 11 and 12 have been rejected by the Examiner under 35 U.S.C. § 102(b) as being anticipated by Matsumoto et al. (DE 3820082 A1). This rejection is respectfully traversed.

A thorough reading of the Matsumoto reference will clearly show that it has little to do with the printhead as defined by the claims of the present application. In the Office Action, the Examiner states (see paragraph 3) that element 1 of Fig. 1 is a channel plate having ink channels. Further, he also identifies the actuators as element 1, composed of a piezoelectric member. In other words, the so-called channel plate and the actuators are one and the same members. Since the actuators and the channel plate in the present invention are clearly separate members, it is apparent that the inkjet printhead of the present invention is structurally different from that of the Matsumoto patent.

In the present invention, a printhead is provided which comprises at least three distinct elements, that is, a channel plate having ink channels, a base member with ink supply passages and an ink reservoir, and actuators for acting on each of the ink channels. The fact that these elements are distinct

and separate elements is essential. Also, as stated in the response to the previous Office Action, the present invention identifies that there is a tendency in printhead technology towards ever increasing the resolution, meaning decreasing the nozzle pitch with smaller dimensions for the ink channels in the width directions. Such small dimensions can only be realized when employing a material having low graininess (reduced grain size). Providing the entire printhead, including the ink reservoir and the ink supply passages, with a material satisfying these requirements would be too expensive, and therefore, economically not viable. Since the ink reservoir 32 and the ink supply passages 40 do not have to meet these stringent dimensional requirements due to the their comparatively large size, the present invention suggests to fabricate only the channel plate containing ink channels, separately, in a high quality material, thereby reducing both material and manufacturing cost.

It is known to be difficult to form small channels with small inter-channel distances (nozzle pitch) in piezoelectric materials. The formation of channels in piezoelectric material is done by means of sawing, which is quite inaccurate and which makes it very difficult to form, in a repetitive way, small channels with small inter-channel distances. For example, even when a saw-blade having a thickness as low as 15  $\mu\text{m}$ , as disclosed in the Matsumoto et al. reference (see column 5, line 46), is used, the maximum resolution obtainable is four dots per mm (about 100 dots per inch). Please seen in this regard

column 5, lines 41-42. In other words, it is not viable to manufacture high resolution printheads by forming ink channels in a piezoelectric material. Therefore, a piezoelectric material is unsuited to be used for the channel plate of the present invention.

Accordingly, in view of the amendments and remarks, reconsideration of the objection and rejections and allowance of the claims of the present application are respectfully requested.

### **Conclusion**

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

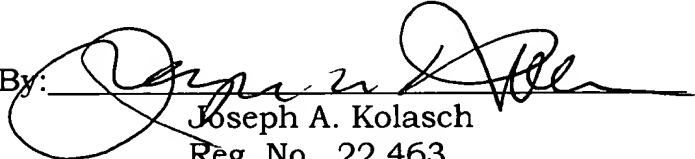
In the event there are any matters remaining in this application, the Examiner is invited to contact Mr. Joseph A. Kolasch, Registration No. 22,463 at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§1.16 or

1.17; particularly, extension of time fees.

Respectfully submitted,

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Enclosure: Marked Up Version of Amendments



## **MARKED UP VERSION OF AMENDMENTS**

### **IN THE CLAIMS**

**Please amend the claims to read as follows:**

1. (Twice Amended) An Ink jet printhead comprising  
a channel plate ~~having provided with~~ a plurality of ink channels ~~etched~~  
~~into~~ at least one surface thereof,  
actuators respectively associated with each of the ink channels for  
pressurizing ink contained in the ink channels, and  
means defining an ink reservoir communicating with the ink channels,  
wherein said ink reservoir is defined by a base member made of a material  
different from that of the channel plate, wherein the channel plate is held in  
butting engagement with a surface of the base member in which an ink supply  
passage is formed for establishing fluid communication between the ink reservoir  
and the ink channels.
3. (Amended) The Ink jet printhead according to claim 1, wherein an  
adhesive layer is provided between the channel plate ~~is fixed to~~ and the base  
member ~~by means of an adhesive~~.

8.— (Amended) An Ink jet printhead comprising  
a channel plate ~~having~~ provided with a plurality of ink channels etched  
~~into~~ in at least one surface thereof,  
actuators respectively associated with each of the ink channels for  
pressurizing ink contained in the ink channels, and  
means defining an ink reservoir communicating with the ink channels,  
wherein said ink reservoir is defined by a base member made of a material  
different from that of the channel plate, said base member being made of  
graphite.

11.— (Amended) An ink jet printhead comprising:  
a channel plate ~~having~~ provided with a plurality of ink channels etched  
~~into~~ in at least one surface thereof;  
a second channel plate having a plurality of ink channels etched into at  
least one surface thereof;  
actuators respectively associated with each of the ink channels for  
pressurizing ink contained in the ink channels; and  
a base member made of a material different from that of said first and said  
second channel plate, wherein an ink reservoir is formed, said ink reservoir

communicating with the ink channels, and wherein a portion of the base member forms a support plate sandwiched between said first channel plate and said second channel plate.

12.— (Amended) An ink jet printhead comprising:

a channel plate ~~having~~ provided with a plurality of ink channels ~~etched into~~ in at least one surface thereof;

actuators respectively associated with each of the ink channels for pressurizing ink contained in the ink channels; and

a base member made of a material different from that of the channel plate, wherein an ink reservoir and ink supply passages are formed, said ink reservoir communicating with the ink channels via the ink supply passages.